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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/617,107	07/09/2003	Gary A. Brist	42P12136C	2613

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EXAMINER

DUONG, KHANH B

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 03/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/617,107

Applicant(s)

BRIST ET AL.

Examiner

Khanh B. Duong

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 February 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 11 and 27-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 11, 27-31 and 34 is/are rejected.
- 7) ☒ Claim(s) 32 and 33 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 22, 2005 has been entered.

Accordingly, claims 1-3, 5, 11, 28 and 29 were amended, and new claims 32-34 were added.

Currently, claims 1-5, 11 and 27-34 are pending in the application.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 11 and 27-30 are rejected under 35 U.S.C. 102(b) as being by Pan (US 4,983,250).

Re claims 1-3, 11 and 28, Pan discloses in Figs. 1-3 a method comprising: applying photo-thermal energy 20 via laser beam to a layer 18 of first material (Ti, Cr, Ni or Si) disposed on a layer 16 of second material (Cu, Au, Al, Ag or Ni) to diffuse a portion of the first material 18 into the second material 16, wherein applying the photo-thermal energy 20 forms electrically conductive traces 22 and 24 [see col. 3, ln. 1 to col. 4, ln. 8]. Pan further discloses the

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interdiffusion between layer 18 and layer 16 could, alternatively, extend through the entire thickness of layer 16 so that the conductive traces 22 and 24 contact the layer of material beneath layer 16 [see col. 3, lines 52-56]. Therefore, in order to create such an interdiffusion, it is expressly understood that the laser beam must penetrate at least beyond the contacting surface between layers 16 and 18 in order to provide a sufficient amount of heat to diffuse a portion of layer 18 into the entire thickness of layer 16.

Re claims 27, Pan expressly discloses in Figs. 1 and 2 the first material 18 comprises a bottom surface and the first material 18 diffuses into the second material 16 such that an alloy 22, 24 is formed below the bottom surface of the first material 18.

Re claims 29, Pan discloses the laser 20 is provided to pattern a desired pattern of electrically conductive traces [see col. 3, ln. 25-27].

Re claims 30, Pan discloses in Fig. 3 removing non-diffused portions of the first material 18 [see col. 3, ln. 59-66].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pan in view of Mori et al. (US 5,821,627).

Re claim 4, Pan discloses the second material includes copper but fails to disclose the first material includes tin and the electrically conductive trace includes a copper tin alloy.

Mori et al. ("Mori") suggests performing solid-phase diffusion bonding between two metals including copper and tin [see col. 9, ln. 5 to col. 10, ln. 64].

Since Pan and Mori are both from the same field of endeavor, the purpose disclosed by Pan would have been recognized in the pertinent prior art of Mori

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Pan by utilizing such materials as suggested by Mori, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.

In re Leshin, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

Claims 5 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pan.

Re claims 5 and 34, Pan discloses the process steps and elements previously as described, but fails to show the following: the laser beam having a width between about 2 mils and about 8 mils, and the electrically conductive trace having a 20-30% larger width than a desired width.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to optimize and select the appropriate widths for the laser beam and the electrically conductive trace. The selection of parameters such as energy, power, concentration, temperature, time, depth, thickness, etc., would have been obvious and involve routine optimization which has been held to be within the level of ordinary skill in the art. "Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may be impart patentability to a process if the particular ranges claimed produce new and unexpected result which is different in kind and not merely degree from results of prior art ... such ranges are termed 'critical ranges' and the applicant has the burden of proving such criticality ... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation". *In re Aller*, 105 USPQ 233, 235 (CCPA 1955). See also MPEP 2144.05.

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pan in view of Lee et al. (US 6,521,523).

Re claim 31, Pan discloses the metal layer comprises copper but fails to disclose the diffusion layer comprises at least one of an organic material, a polymer epoxy, or an organic metal.

Lee et al. ("Lee") suggests diffusing an aluminum organic material layer 212 into a copper layer 210 to form an aluminum copper alloy layer 212a, and eventually an aluminum oxide layer 212b [see FIG. 7; col. 5, ln. 6-32].

Since Pan and Lee are both from the same field of endeavor, the purpose disclosed by Lee would have been recognized in the pertinent prior art of Pan.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Pan by utilizing such materials as suggested by Lee, since Lee states at column 5, lines 33-35 that resultant aluminum oxide layer can function as a conventional sealing layer to prevent copper diffusion and oxidation.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-5, 11 and 27-34 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 of U.S. Patent No. 6,642,158 ("the Patent"). Although the conflicting claims are not identical, they are not patentably distinct from each other because the present application merely broadens the claims of the Patent.

Allowable Subject Matter

Claims 32 and 33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments filed February 22, 2005 have been fully considered but they are not persuasive.

Applicant persistently argues that Pan does not disclose a laser beam penetrating beyond a first material and into a second material. In response, the Examiner respectfully disagrees because Pan alternatively discloses extending the interdiffusion between layer 18 and layer 16 through the entire thickness of layer 16 [see col. 3, lines 52-56]. Thus, it is understood that such interdiffusion is expressly done by penetrating the laser beam at least beyond the contacting surface between layers 16 and 18 in order to provide a sufficient amount of heat to diffuse a portion of layer 18 into the entire thickness of layer 16.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Fujimoto et al. (US 5,829,125) discloses relevant teaching regarding laser-assisted solid-state diffusion.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Duong whose telephone number is (571) 272-1836. The examiner can normally be reached on Monday - Thursday (9:00 AM - 6:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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